AMENDMENTS TO CLAIMS

The following listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Amended) A method of reducing a compound to form a reduction product, said method comprising the step of combining the compound with a lanthanide catalyst having the formula:

$$G_1\text{-}M\text{-}G_2$$

wherein;

M is either a Dysprosium or a Neodymium ~~a lanthanide other than the Europium, Ytterbium or Samarium~~;

G_1 and G_2 are chemical entities independently selected from the group consisting of a halogen, an alkyl, an aryl, an NR_2, an OR_2, a PR_2 and an SR; wherein N is a nitrogen, O is an oxygen, P is a phosphorus and R is selected from the group consisting of an alkyl, an aryl, and a cycloalkyl from about 1 to about 20 carbon atoms.

2. (Cancelled)

3. (Cancelled)

4. (Cancelled)

5. (Cancelled)

6. A method according to claim 1 wherein G_1 is an Iodine.

7. A method according to claim 1 wherein G_2 is an Iodine.

8. A method according to claim 1 wherein G_1 and G_2 are the same halogen.

9. A method according to claim 1 wherein G_1 and G_2 are different halogens.

10. (Amended) A method according to claim 1 wherein M is a ~~Thulium~~ Neodymium and G_1 and G_2 are iodines.

11. A method according to claim 1 wherein M is a Dysprosium and G_1 and G_2 are iodines.

12. A method according to claim 1 wherein M is complexed with at least one solvent molecule, S.

13. A method according to claim 12 wherein the solvent molecule comprises a Lewis base.

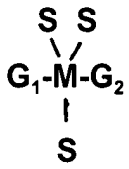
14. A method according to claim 13 wherein the Lewis base is a heteroatom donor base.

15. A method according to claim 13 wherein the Lewis base is selected from the group consisting of di-alkyl-oxy-ethanes, tetrahydrofuran, dienes, nitriles and ethers.

16. A method according to claim 13 wherein the Lewis base comprises a di-alkyl-oxy-ethane.

17. A method according to claim 13 wherein the Lewis base comprises a dimethoxyethane.

18. (Amended) A method according to Claim 12 wherein the complex has the general Formula B:



wherein;

M either a Dysprosium or a Neodymium ~~is a lanthanide other than the Europium, Ytterbium or Samarium~~;

G_1 and G_2 are chemical entities independently selected from the group consisting of a halogen, an alkyl, an aryl, an NR_2, an OR_2, a PR_2 and an SR; wherein N is a nitrogen, O is an oxygen, P is a phosphorus and R is selected from the group consisting of an alkyl, an aryl, and a cycloalkyl from about 1 to about 20 carbon atoms; and,

S is dimethoxyethane (DME).

19. (Amended) A method according to claim 18 wherein M is a Neodymium ~~Thulium,~~ G_1 and G_2 are Iodine and S is dimethoxyethane.

20. A method according to Claim 18 wherein M is Dysprosium, G_1 and G_2 are Iodine, and S is dimethoxyethane.

21. A method according to claim 1 wherein the compound is an organic compound, the lanthanide catalyst effects alkylation of the compound, and the reduction product is an alkylated organic compound.

22. A method according to claim 21 wherein the lanthanide catalyst is a Thulium diiodide.

23. A method according to claim 21 wherein the lanthanide catalyst effects alkylation of the organic compound with RJ, wherein R is an alkyl and J is a halogen selected from the group consisting of Iodine, Bromine, Chlorine and Fluorine.

24. A method according to claim 23 wherein G_1 and G_2 are Bromine.

25. A method according to claim 23 wherein G_1 and G_2 are Chlorine.

26. A method according to claim 1 wherein the compound comprises a polymerizable unit and the reduced product is a polymer.

27. A method according to claim 26 wherein the M is a Dysprosium, G_1 and G_2 are Iodine.

28. A method according to claim 26 wherein the polymerizable unit comprises isoprene.

29. (Amended) A polymeric reduction product made from a process comprising the step of combining a compound which comprises a polymerizable unit with a lanthanide catalyst having the general Formula A:

$$\mathbf{G_1\text{-}M\text{-}G_2}$$

wherein;

L is a lanthanide other than the Europium, Ytterbium or Samarium;

G_1 and G_2 are chemical entities independently selected from the group consisting of a halogen, an alkyl, an aryl, an NR_2, an OR_2, a PR_2 and an SR; wherein N is a nitrogen, O is an oxygen, P is a phosphorus and R is selected from the group consisting of an alkyl, an aryl, and a cycloalkyl from about 1 to about 20 carbon atoms.

30. (Cancelled)

31. A reduction product according to claim 29 wherein the M is a Dysprosium, G_1 and G_2 are Iodine.

32. A reduction product according to claim 29 wherein the polymerizable unit comprises isoprene.

33. (Amended) A method for making a dihalogenated lanthanide compound, ~~wherein the lanthanide is other than Europium, Ytterbium or Samarium~~, said method comprising the steps of:

combining a Dysprosium~~lanthanide~~ metal with a halogen;

reacting the ~~lanthanide~~ Dysprosium metal with the halogen to form an initial mixture; and

heating the initial mixture for about 1 to about 60 minutes.

34. (Cancelled)

35. (Cancelled)

36. A method according to claim 33 wherein the halogen is selected from the group consisting of Iodine, Bromine, Chlorine and Fluorine.

37. A method according to claim 33 wherein the halogen is Iodine.

38. A method according to claim 33 wherein the heating is for about 2 to about 30 minutes.

39. (Cancelled)

40. (Cancelled)

41. (Cancelled)

42. (Amended) A method according to claim ~~39~~ 33 wherein the halogen is selected from the group consisting of Iodine, Bromine, Chlorine and Fluorine.

43. (Amended) A method according to claim ~~39~~ 33 wherein the halogen is Iodine.

44. (Amended) A method according to claim ~~39~~ 33 wherein the solvent molecule S comprises a Lewis base.

45. (Amended) A method according to claim ~~39~~ 33 wherein the Lewis base is selected from the group consisting of di-alkyl-oxy-ethanes, tetrahydrofuran, dienes, nitriles and ethers.

46. (Amended) A method according to claim ~~39~~ 33 wherein the Lewis base comprises a dimethoxyethane.

47. (Cancelled)

48. (New) A method of reducing a compound to form a pollmeric reduction product, said method comprising the step of combining the compound which comprises a polymerizable unit with a lanthanide catalyst having the formula:

$$G_1\text{-}M\text{-}G_2$$

wherein;

M is a lanthanide other than the Europium, Ytterbium or Samarium;

G_1 and G_2 are chemical entities independently selected from the group consisting of a halogen, an alkyl, an aryl, an NR_2, an OR_2, a PR_2 and an SR; wherein N is a nitrogen, O is an oxygen, P is a phosphorus and R is selected from the group consisting of an alkyl, an aryl, and a cycloalkyl from about 1 to about 20 carbon atoms.

49. (New) A method according to claim 48 wherein M is selected from the group consisting of Thulium, Dysprosium, Neodymium, Cerium, Praseodymium, Gadolinium, Terbium, Holmium, Erbium, Lutetium, Lanthanum and Yttrium.

50. (New) A method according to claim 48 wherein the M is a Thulium.

51. (New) A method according to claim 48 wherein the M is a Dysprosium.

52. (New) A method according to claim 48 wherein the M is a Neodymium.

53. (New) A method according to claim 48 wherein G_1 is an Iodine.

54. (New) A method according to claim 48 wherein G_2 is an Iodine.

55. (New) A method according to claim 48 wherein G_1 and G_2 are the same halogen.

56. (New) A method according to claim 48 wherein G_1 and G_2 are different halogens.

57. (New) A method according to claim 48 wherein M is a Thulium and G_1 and G_2 are iodines.

58. (New) A method according to claim 48 wherein M is a Dysprosium and G_1 and G_2 are iodines.

59. (New) A method according to claim 48 wherein M is complexed with at least one solvent molecule, S.

60. (New) A method according to claim 59 wherein the solvent molecule comprises a Lewis base.

61. (New) A method according to claim 60 wherein the Lewis base is a heteroatom donor base.

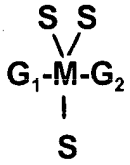
62. (New) A method according to claim 60 wherein the Lewis base is selected from the group consisting of di-alkyl-oxy-ethanes, tetrahydrofuran, dienes, nitriles and ethers.

63. (New) A method according to claim 60 wherein the Lewis base comprises a

di-alkyl-oxy-ethane.

64. (New) A method according to claim 60 wherein the Lewis base comprises a dimethoxyethane.

65. (New) A method according to Claim 59 wherein the complex has the general Formula B:



wherein;

M is a lanthanide other than the Europium, Ytterbium or Samarium;

G_1 and G_2 are chemical entities independently selected from the group consisting of a halogen, an alkyl, an aryl, an NR_2, an OR_2, a PR_2 and an SR; wherein N is a nitrogen, O is an oxygen, P is a phosphorus and R is selected from the group consisting of an alkyl, an aryl, and a cycloalkyl from about 1 to about 20 carbon atoms; and,

S is dimethoxyethane (DME).

66. (New) A method according to claim 65 wherein M is Thulium, G_1 and G_2 are Iodine and S is dimethoxyethane.

67. (New) A method according to Claim 65 wherein M is Dysprosium, G_1 and G_2 are Iodine, and S is dimethoxyethane.

68. (New) A method according to claim 48 wherein the compound is an organic compound, the lanthanide catalyst effects alkylation of the compound, and the reduction product is an alkylated organic compound.

69. (New) A method according to claim 68 wherein the lanthanide catalyst is a Thulium diiodide.

70. (New) A method according to claim 68 wherein the lanthanide catalyst effects alkylation of the organic compound with RJ, wherein R is an alkyl and J is a halogen selected from the group consisting of Iodine, Bromine, Chlorine and Fluorine.

71. (New) A method according to claim 70 wherein G_1 and G_2 are Bromine.

72. (New) A method according to claim 70 wherein G_1 and G_2 are Chlorine.

73. (New) A method according to claim 70 wherein the M is a Dysprosium, G_1 and G_2 are Iodine.

74. (New) A method according to claim 70 wherein the polymerizable unit comprises isoprene.